# What Makes Lessons Learned Programs Work?

...Influencing Recipient Behaviors

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SELLS April 2006 Workshop



## Motivation

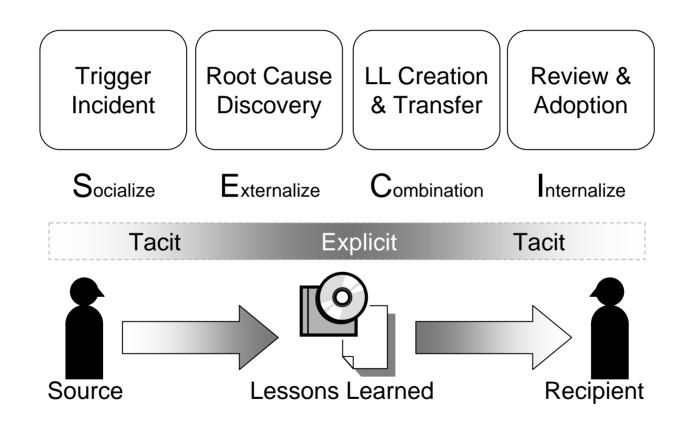
- Lessons Learned systems are intuitively attractive –
   Learn from the mistakes of others
- Organizations attempt to promote this type of vicarious learning through implementing computer-based information technologies to retain and "make available" lessons learned

Brown et al. 1998; McDermott 1999; Mohrman et al. 2003; Olivera 2000, Weber & Aha, 2001

- A review of 41 formal lessons learned systems have shown that these systems rely on different strategies to support the reuse of these lessons learned.
  - 31 U.S. Government non-military
  - 7 Military
  - 3 Private

#### Outline

- Lessons Learned Process Model
- Defining Recipient Behaviors
- Hypothesis Building & Testing
- Other Analyses
- Conclusions & Implications



# Lesson Learned Program Review

41 LL systems reviewed via available documentation

#### **Background**

System Name
Organization Name
Contact
Focus
Access (Y/N)
Hyperlink
Comments
Potential Data Collection

#### <u>S</u> Trigger Trigger Importance

E Causal Investigation

# Recommendation Capture & Integrate Number Created IT Description Ontology Depth Relevance Network Communication Policy Communication Methods

Review Process
Number Transferred
Internalization Goal
Action/Outcome
Number Applied

# Org Context Mission or Goal Monitoring Policy Incentives Intermediaries

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# Lesson Learned Program Summary

Trigger Incident	Root Cause Discovery	Creation & Transfer	Review & Adoption	Organization Context (e.g. Mission, Monitoring,
S	E	С		Facilitation)
37	22	41	30	38
90%	54%	100%	73%	93%
17 (41%)	of programs	reviewed dis	cussed all	

17 (41%) of programs reviewed discussed all SECI phases

How to measure which programs are most effective and what factors influence effectiveness?

## Effectiveness = Internalization

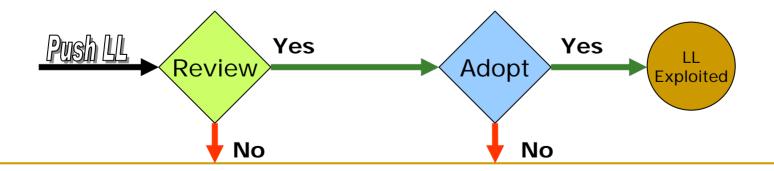
Investigate organizational interventions that impact two recipient behaviors

#### **Information Review**

Time an individual devotes to reading and assimilating lessons learned information

#### **Information Adoption**

- EXTERNAL
  - □ Lessons learned which have been acted upon by changing organizational artifacts under their direct control or influence; such as, technologies (e.g.; process, products) or routines (e.g.; procedures, work plans, training manuals)
- INTERNAL
  - Alternatively, an individual recipient may simply retain the information within their internal schema and take action when they are presented with a similar situation avoiding the incident that triggered the original lesson learned



## Scientific Method

- Observe phenomena
- Formulate hypotheses to explain phenomena and predict results
- Test Hypotheses

# Lesson Learned Systems Applications

Insight and experiences gained regarding Lessons Learned System Planning, Implementing, Assessing, and Improving

#### Personal Involvement - Action Research Perspective

- Planned and Implement New Product Development LL System
- Consultant for (2) LL System Development Teams
- SELLS Member: bi-annual meetings & regular conference calls
   <u>Published Sources</u>
- INEEL Report: History & Assessment of DOE Site System
- GAO Report of NASA LLIS
- Construction Industry Institute Research Report 123-11
- Kentucky DOT Report: development of an on-line system
- NTSB Website

#### What Influences Internalization?

- Reinforcing Activities
  - Clear Expectations to review and adopt
  - Monitoring weather it happens
- Facilitation
  - Within Group
    - manager, operator, other
  - External from group
    - Lesson Learned Coordinator

## What Influences a Recipient's Behaviors

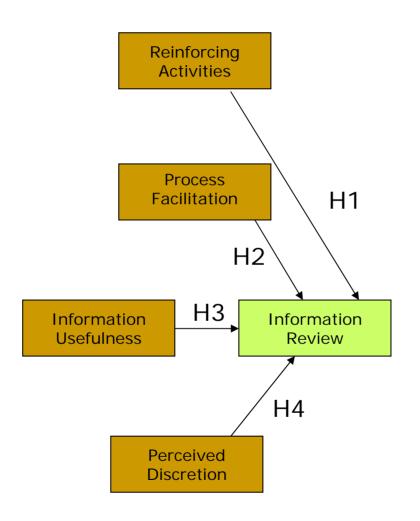
#### Information Usefulness

 Recipient's perception that the lessons learned are valuable, informative, and helpful in planning actions to achieve their assigned job responsibilities.

#### Perceived Discretion

- Perception that recipient has the opportunity and resources to Review and Adopt on information.
  - Resources
  - Site Knowledge
  - Similarity to other SItes

# Stage 1: Information Review



- H1:Increased metastructuring activities will increase information review.
- H2: Increased internalization process facilitation will increase information review.
- H3: Increases information usefulness increases information review.
- H4: An increase in a recipient's perceived discretion will increase information review.

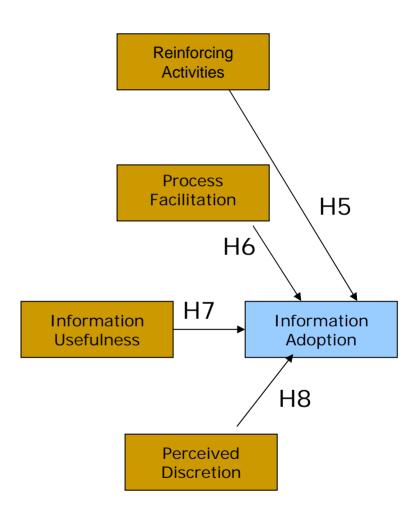
# Stage 2: Information Adoption

H5: Increased reinforcing activities activities will increase information adoption.

H6: Increased process facilitation will increase information adoption.

H7: Increased information usefulness increases information adoption.

H8: An increase in a recipient's perceived discretion will increase information adoption.



# Testing Hypotheses: Study Design

#### Choose Sites

- 4 sites chosen based on how they facilitate and reinforce the lessons learned process
- Unfortunately 2 dropped out
- Site Visit
  - Characterize System & Distribution Mechanism
    - Interviews with lessons learned coordinators
    - Interviewed several Lessons learned recipients
- Recipient Survey

## Data Collection: Interviews



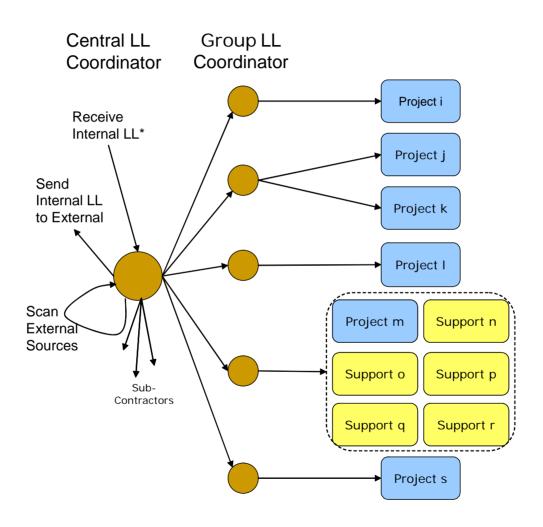
#### Site A

Name	Original time	Edited time	Time Reduced	Efficiency
0 Site A LLC 13ap05	1:43:38	1:37:21	0:06:17	94%
1 LLC 15ap05	0:33:14	0:28:06	0:05:08	85%
2 LLC 15ap05	0:53:18	0:48:42	0:04:36	91%
3 LLC 15ap05 pt1 & pt2	0:47:35	0:45:01	0:02:34	95%
4 LLC 15ap05	0:37:37	0:30:09	0:07:28	80%
5 LLC 18ap05	1:06:59	0:58:05	0:08:54	87%
Site a LLR01 29AP05	1:00:59	0:37:38	0:23:21	62%
Site a LLR02 29AP05	0:42:37	0:36:48	0:05:49	86%
Site a LLR03 02MY05	0:28:38	0:21:53	0:06:45	76%
Site a LLR04 02MY05	0:28:13	0:25:14	0:02:59	89%
Site a LLR05 02MY05	0:18:35	0:17:15	0:01:20	93%
Site a LLR06_07 02MY05	0:24:11	0:21:45	0:02:26	90%
Site a LLR08 02MY05	0:19:18	0:16:28	0:02:50	85%
Site a LLR09 03MY05	0:12:17	0:11:05	0:01:12	90%
Site a LLR10_11 03MY05	0:32:53	0:29:08	0:03:45	89%
Site a LLR12 03MY05	0:40:25	0:34:57	0:05:28	86%
Site a LLR13 03MY05	0:29:09	0:26:49	0:02:20	92%
Site a LLR14 29AP05	0:38:47	0:24:13	0:14:34	62%
TOTALS	11:58:23	10:10:37	1:47:46	85%

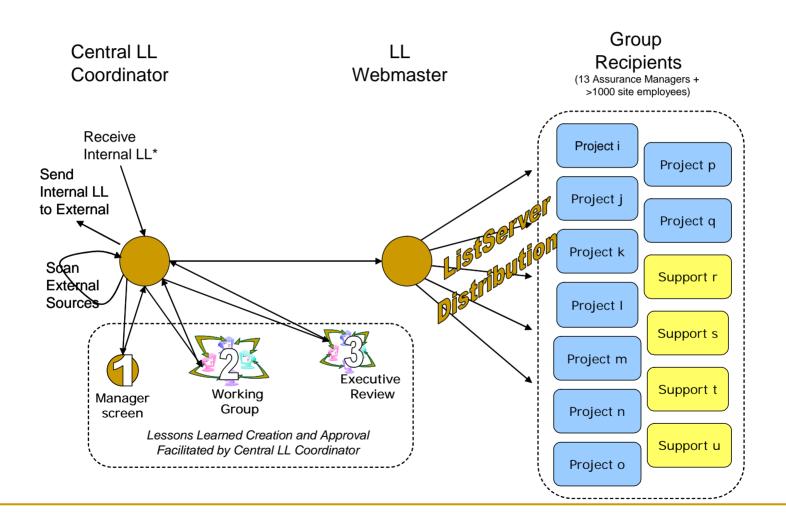
#### Site B

Name	Original time	Edited time	Time Reduced	Efficiency
LLC Pre meeting 2005_06_01	1:39:09	1:33:12	0:05:57	94%
005_E_001_jrv_2005_06_28.dvf	0:24:33	0:19:20	0:05:13	79%
005_E_002_jrv_2005_06_28.dvf	0:31:53	0:16:39	0:15:14	52%
005_E_003_jrv_2005_06_28.dvf	0:14:00	0:11:08	0:02:52	80%
005_E_004_jrv_2005_06_28.dvf	0:28:22	0:12:12	0:16:10	43%
005_E_005_jrv_2005_06_29.dvf	0:25:27	0:24:53	0:00:34	98%
005_E_006_jrv_2005_06_29.dvf	0:17:29	0:17:02	0:00:27	97%
005_E_007_jrv_2005_06_29.dvf	0:16:43	0:14:31	0:02:12	87%
005_E_008_jrv_2005_06_29.dvf	0:15:14	0:13:19	0:01:55	87%
005_E_009_jrv_2005_06_29.dvf	0:21:37	0:21:10	0:00:27	98%
005_E_010_jrv_2005_06_29.dvf	0:13:00	0:13:00		100%
005_E_011_jrv_2005_06_29.dvf	0:20:47	0:20:04	0:00:43	97%
005_E_012_jrv_2005_06_30.dvf	0:13:21	0:13:21		100%
005_E_013_jrv_2005_06_30.dvf	0:14:48	0:14:48		100%
005_E_014_jrv_2005_06_30.dvf	0:33:46	0:25:38	0:08:08	76%
005_E_015_jrv_2005_06_30.dvf	0:17:33	0:12:11	0:05:22	69%
005_E_016_jrv_2005_06_30.dvf	0:18:17	0:17:45	0:00:32	97%
005_E_017_jrv_2005_06_30.dvf	0:20:11	0:17:33	0:02:38	87%
TOTALS	7:26:10	6:17:46	1:08:24	85%

### Site A Distribution Method

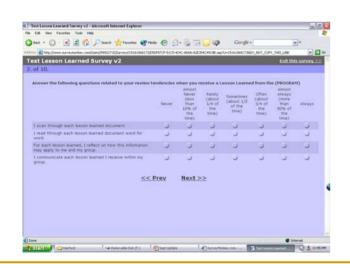


## Site B Distribution Method

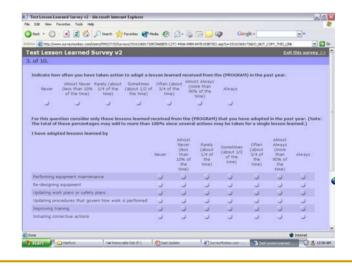


## Data Collection: Survey

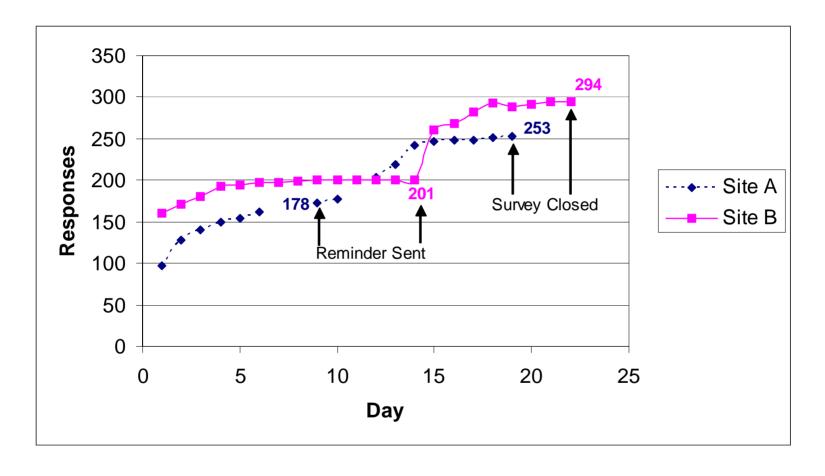
Created and Administered through Survey Monkey







# Survey Response History



# Response Rate

SITE A

Total people	Total dist	Total	Response
on site	Total dist	Response	Rate
4032	562	267	48%
	% of site	% of site	
	surveyed	Responded	
	14%	7%	

SITE B

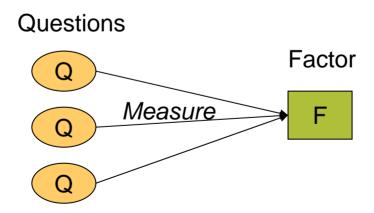
	Total people on site	Total dist	Total Response	Response Rate
10000		1205	294	24%
		% of site	% of site	
		surveyed	Responded	
		12%	3%	

# Data Analysis

- Step 1: Survey Analysis
  - Focus on survey responses to understand factors that influence recipient behaviors regardless of the site
- Step 2: Site Contrasts
  - Test site strategies impact on survey responses

# Step 1 Survey Analysis

- Factor identifies questions that are closely related based on the recipient responses.
- These questions are combined into a factor and a factor score is generated



# Data Analysis: Recipient Analysis

Perception Factors



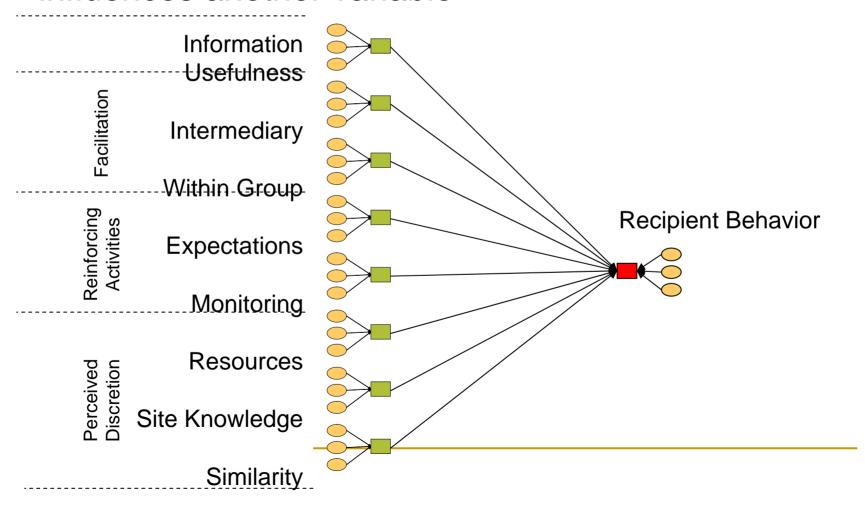
- Information Usefulness
- Facilitation Intermediary, Within Group
- Reinforcing activities Expectations, Monitoring
- Discretion Resources, Site Knowledge, Similarity
- Reported Behaviors



- Review
- Internal Adoption
- External Adoption

# Regression Analysis

A method to understand if a variable significantly influences another variable



# Regression Results

w/ Only Significant factors in model AND one-sided Criteria

Regression An	$R_{\Theta V i\Theta W}$			
# of Obse	388			
$R^2$	0.385			
Info Usefulness		***	]	
Facilitation	Fac. Intermediary	***	j	
Facilitation	Fac. Group	***		
Reinforcing	Expectations	***		
Activities	Monitoring	***		
	Resources	***		
Perceived Discretion	Site Knowledge	***		
	Similarity			

\*\*\* sig @ .001

\* sig @ .01

sig @ .05

# Regression Results

w/ Only Significant factors in model AND one-sided Criteria

Regression An	alysis	$R_{\Theta \nu i_{\Theta W}}$	Adopt Internal	
# of Obser	388	319		
$R^2$		0.385	0.376	
Info Usefulness		***	***	
Facilitation	Fac. Intermediary	***	*	
Facilitation	Fac. Group	***	***	
Reinforcing	Expectations	***	***	
Activities	Monitoring	***	*	
	Resources	***	***	
Perceived Discretion	Site Knowledge	***	**	
	Similarity			

\*\*\* sig @ .001

\*\* sig @ .01

sig @ .05

## Regression Results

w/ Only Significant factors in model AND one-sided Criteria

Regression An	$R_{\Theta \nu i\Theta W}$	Adopt Internal	Adopt External		
# of Obse	# of Observations			319	
$\mathbb{R}^2$	0.385	0.376	0.167		
Info Usef	***	***	***		
Facilitation	Fac. Intermediary	***	*		
Facilitation	Fac. Group	***	***	***	
Reinforcing	Expectations	***	***		
Activities	Monitoring	***	*		
	Resources	***	***		
Perceived Discretion	Site Knowledge	***	**	**	
	Similarity				

\*\*\* sig @ .001

\*\* sig @ .01

\* sig @ .05

All Factors Help...
What should you invest in?

What is the implication of "site knowledge"?

# Step 2: Site Strategy Contrasts

w/ Only Significant factors in model AND one-sided Criteria

Regression An	$R_{\Theta \nu i\Theta W}$	Adopt Internal	Adopt External		
# of Obse	rvations	388	319	319	
$R^2$	$R^2$			0.167	
Info Usef	ulness	***	***	***	
Facilitation	Fac. Intermediary	***	*		
Facilitation	Fac. Group	***	***	***	
Reinforcing	Expectations	***	***		
Activities	Monitoring	***	*		
	Resources	***	***		
Perceived Discretion	Site Knowledge	***	**	**	
	Similarity				

Site B

Site A

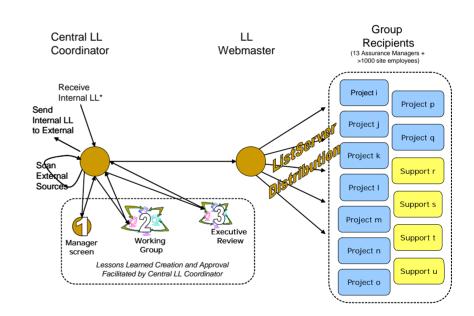
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# Increasing Information Usefulness

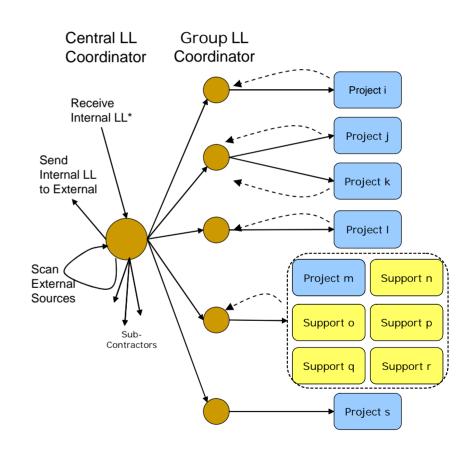
- Site B: Attempts to develop more useful information by getting a variety of perspectives, adding pictures and formatting for easy printing.
- Site A: LLC reviews lessons learned before distribution but does not edit them much, or take into account recipient perspective.
- Test: Site B's Information usefulness scores were significantly greater that Site A's



# Increasing Expectations/Monitoring

- 4 out of 5 Site B Lessons Learned Coordinators used a To: list with voting buttons, requiring a response.
- Site A simply sent out the emails with no voting response required
- Test: Site A's Expectations and Monitoring Scores were significantly greater that Site B's

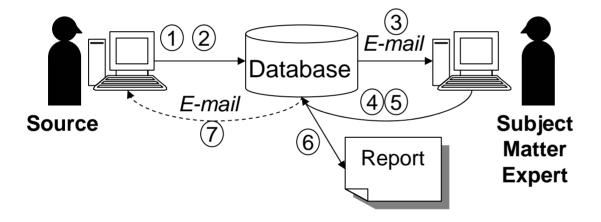
Note: Many Other actions can effect expectations and monitoring



## Evolution of Experience – The Lessons Learned Culture

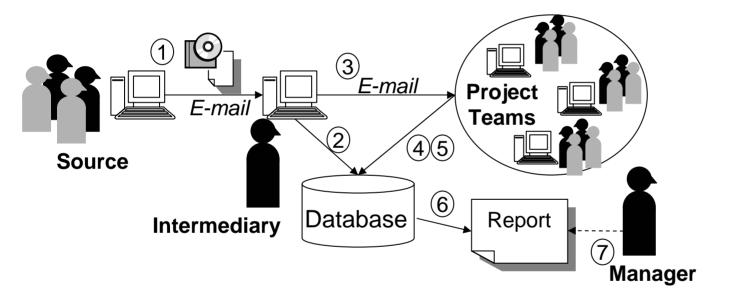
- Human Facilitation is important for Internalization
  - Consider pushing this responsibility up the organization
  - Guard against over investing in Information Technology
- Value those with Site Knowledge because they are able identifying and adopting lessons learned
- Focus on making useful information and targeting your recipients
  - Relevance to recipient is still a big issue on both sites

## Case #1



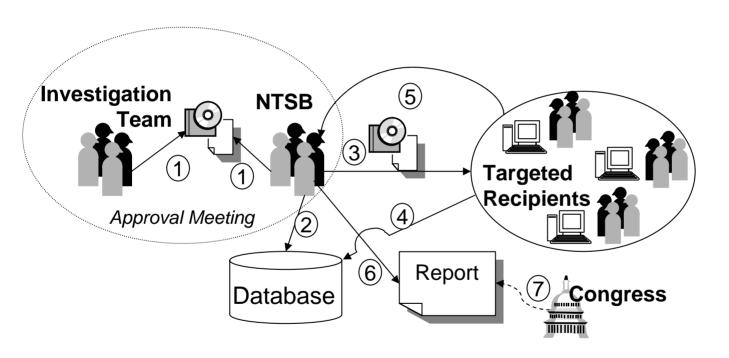
- 1) Creation
- 2 Index
- (3) Transfer
- (4) Review
- (5) Respond
- 6 Summarize
- (7) Monitor

## Case #2



- 1 Creation
- (2) Index
- (3) Transfer
- (4) Review
- (5) Respond
- (6) Summarize
- 7 Monitor

#### Case #3

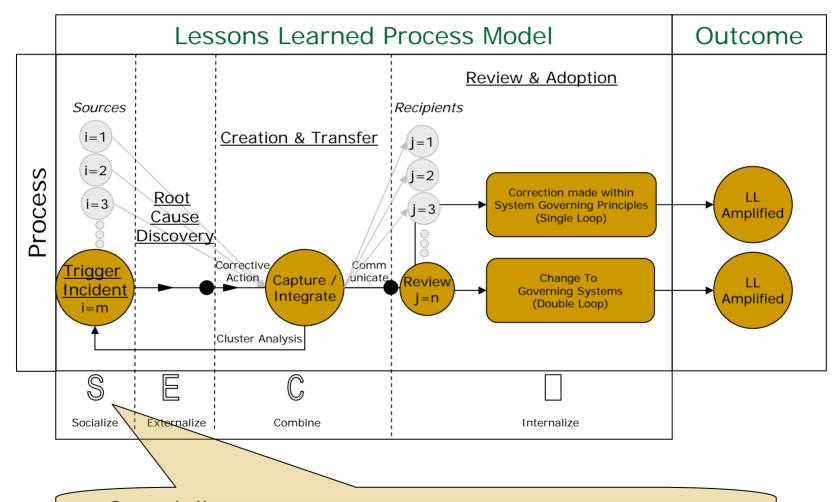


- 1 Creation
- (2) Index
- (3) Transfer
- (4) Review
- 5 Respond
- 6 Summarize
- 7 Monitor

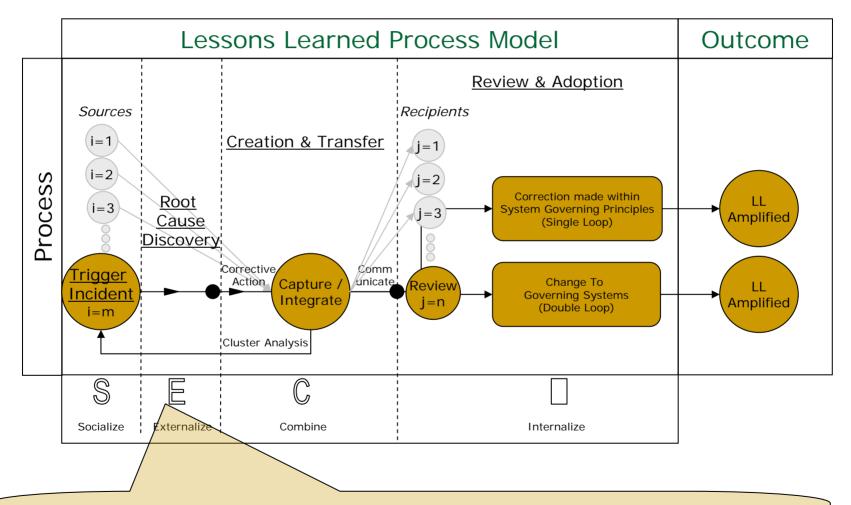
# Site Reports

- Cover Letter
- DOE Standard Assessment
- Survey Results

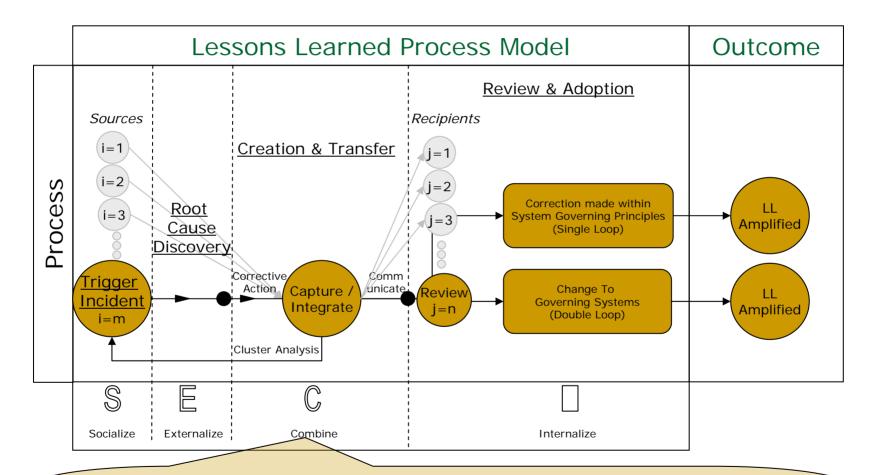
# End of Presentation



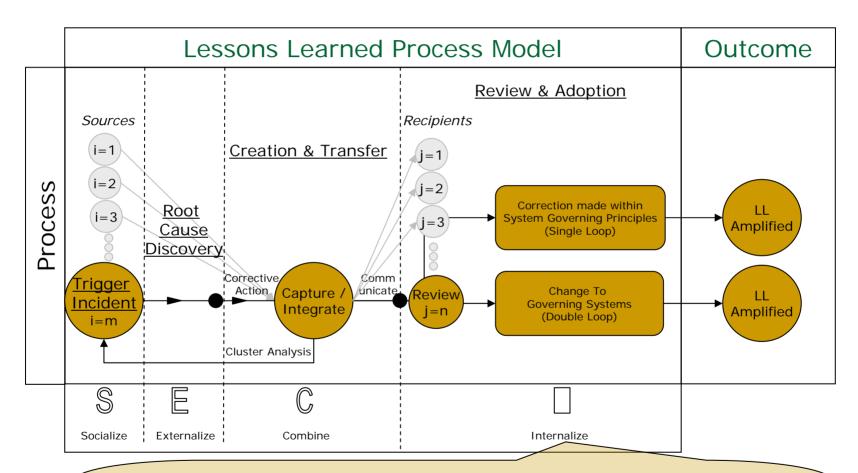
<u>S-socialize</u>. Once a trigger occurs, people collect at the trigger location to experience first-hand the tacit nature of the problem



<u>E-externalize</u>. Following this event people investigate several causal chains discussing and documenting their findings along the way.



<u>C-combined</u>. After the investigation reaches a definitive stage, the causal information is integrated to develop a set of recommendations or corrective actions, which are contained in reports, presentations, e-mails, and databases (e.g. Lesson Learned Systems).



- I-internalize. Recipients review the lessons learned and make a judgment on how to adopt the recommendations
- 1. Single-Loop: an immediate fix without changing the system
- 2. Double-Loop: changes to the system's underlying principles.